REMARKS/ARGUMENTS

Thorough examination and careful review of the application by the Examiner is noted and appreciated.

Paragraph 0051 of the specification was amended to include the previously omitted reference numbers 90, 100, 102, and 104 referring to an ohmmeter, a computer, a programmable logic controller, and embedded processor as disclosed in Applicants' Specification, paragraph 0044, and 0051.

Figure 9 has been amended to add the previously omitted reference numbers and lines 100, 102, 104 thereto.

The examiner has rejected claims 1-21. Claims 1, 13, 18 have been amended. Claims 22-23 have been newly added. Claims 1-23 are pending.

The changes in the specification, claims and drawings do not introduce new matter but clarify matters shown and described in the application as filed. The foregoing amendments and following remarks are believed to be fully responsive to the Office Action mailed January 21, 2004 and render all currently pending claims at issue patentably distinct over the references cited by the Examiner. The foregoing amendments are taken in the interest of expediting prosecution and there is no intention of surrendering any range of equivalents to which Applicant would otherwise be entitled in view of the prior art. Reconsideration and examination of this application is respectfully requested in light of the foregoing amendments and the following remarks.

EXAMINER'S OFFICE ACTION

In the January 21, 2004 Office Action referenced above, the Examiner:

objected to the drawings under 37 CFR 1.83(a) as failing to show every feature of the invention specified in the claims;

rejected claims 1, 3, 5-9, and 13-20 under 35 USC §102(b) as being anticipated by Takahashi et al., U.S. Patent No. 4,918,977(hereinafter, "TAKAHASHI");

rejected Claims 2 and 4 under 35 USC §103(a) as being unpatentable over TAKAHASHI in view of Prince et al., United Kingdom Foreign Document No. GB 2276948 A (hereinafter, "PRINCE");

rejected Claims 10-12, and 21 under 35 USC §103(a) as being unpatentable over TAKAHASHI in view of GOTT, U.S. Patent No. 6,175,310 B1 (hereinafter, "GOTT").

Objections to the Drawings

The drawings are objected to under 37 CFR 1.83(a) as failing to show every feature of the invention specified in the claims. More particularly, as suggested by the Examiner in the January 21, 2004 OA, page 2, clause 2, "the personal, computer, programmable logic controller and embedded processor must be shown or the features canceled from the claims."

Accordingly, the personal computer 100, the programmable logic controller 102, and the embedded processor 104 is now shown in amended Figure 9. The personal computer 100, the programmable logic controller 102, and the embedded processor 104 were originally disclosed in Applicants' Specification, paragraph 0051, however, the reference numbers were inadvertently omitted. The elements 100, 102, and 104 refer to alternative control and sense circuitry to that of an

ohmmeter 90 disclosed in Applicants' Specification, paragraph 0044 as follows: "Control and sense circuitry may comprise an ohmmeter which measures simple resistance."

Thus, the objections to the drawings under 37 CFR 1.83(a) have been obviated.

Rejections under 35 U.S.C. §102

In the Office Action, claim 1, 3, 5-9, and 13-20 stand rejected under 35 U.S.C. §102(b) as being anticipated TAKAHASHI.

The rejection of claims 1, 3, 5-9, and 13-20 based on TAKAHASHI is respectfully traversed.

The TAKAHASHI reference, teaches discloses a pair of wiry electrodes each having an inner liquid resistant body layer of insulation and an outer body layer of insulation. Both the inner body layer of insulation disposed thereon adapted to dissolve in the presence of strong acids or alkalis. See TAKAHASHI, Claim 1, col. 15, lines 52-58. The inner body insulator layer is made of macromolecular material including an ester bond. See TAKAHASHI, col. 1, lines 63-col. 2, line 2. The outer layer consisting of a liquid-absorbent material. See TAKAHASHI, col. 1, lines 53-54, and claim 1, col. 15 lines 60-61. The liquid-absorbent material forms a braided body layer made of liquid-absorbent yarn which is disposed outside of the pair of wiry electrodes in one embodiment and which is disposed on an outer periphery of each of the wiry electrodes in an alternative embodiment. See TAKAHASHI, Abstract. The insulators of the TAKAHASHI invention are "adapted to dissolve in the presence of strong acids or alkalis." TAKAHASHI, Claim 1, col. 15, lines 57-58. In operation, if sulfuric acid or

alkali liquid leaks onto the outer layer of the wiry electrodes, the liquid absorbent material of the outer insulator layer covering the wiry electrodes absorbs such leakage. See TAKAHASHI, col. 2, lines 50-58. The liquid thus absorbed causes the insulator layers to dissolve to short-circuit the conductors. See TAKAHASHI, Abstract, col. 2, lines 7-11, and col. 8, lines 6-9.

By contrast, amended claim 1 of the present invention provides a liquid leak detector having:

> at least one electrical conductor characterized by **an electrically insulative, porous sheath** effective to provide electrical isolation of said at least one electrical conductor from the another electrical conductor; and
>
> circuitry coupled to said electrical conductors effective to measure a resistance of the combination of the pair of electrical conductors and **an electrical short therebetween caused by local conductivity through the porous sheath at a location whereat said liquid leak penetrates said sheath**, whereby the resistance indicates the existence of a leak and the relative location of the leak along said at least one electrical conductor, **wherein the liquid leak is ionic in nature**.

Applicants' invention requires electrically insulative sheathing and low resistance electrical short therethrough in the event of a liquid leak penetration of any ionic fluid or liquid. See Applicants' Specification, paragraph 0031, 0032, 0034, and 0042. "Tank 50 contains a liquid which may be transported via conduit 51." Applicants' Specification, paragraph 0032. "The **ionic** nature of the **fluid** makes this current path an effective short between the conductors."

Applicants' Specification, paragraph 0034. "The **ionic** nature of the **fluid** makes this current path an effective short between the sensing wire 85 and the drip tray 83." Applicants' Specification, paragraph 0042.

With respect to the rejection of independent claims 1, 13, and 18, the TAKAHASHI reference does not teach or suggest the claimed invention. TAKAHASHI fails to yield Appellants' invention in as much as TAKAHASHI requires two insulative sheaths, one being an outer liquid-absorbent sheath, and an inner insulative sheath having liquid resistant properties that operates to dissolve in the presence of sulfuric acids or strong alkalis.

Unlike TAKAHASHI, the leak detector of the present invention can even detect a leak of a liquid such as deionized water using copper sulfate coating as described in a preferred embodiment of the present invention. See Applicants' Specification, paragraph 0035, and Claim _. "Additionally, the sensing wire 55 may be treated chemically to provide a visual indication of its contact with **a fluid**. . . . An additional benefit of such treatment for visually **indicating a leak is that commonly used deionized water** has significantly higher resistively that do the other process fluids, and a leak of the deionized water may be difficult to detect electrically." Applicants' Specification, paragraph 0035.

TAKAHASHI, by contrast, requires two sheaths, one having liquid absorbing properties, and one having liquid resistant properties to diluted liquids that are not sulfuric acid or strong alkalis, such as those disclosed in Applicants' Specification. Because the inner insulator layer of the TAKAHASHI wire conductor contacts any ionic or aqueous liquid, it will not dissolve, and therefore a leak of any aqueous

liquid would not be detected. The inner insulator layer only dissolves and thus, forms an electrical short between the liquid and the conductor if the liquid is a sulfuric acid or an alkali liquid having a predefined concentration.

Unlike TAKAHASHI, the present invention only requires a single sheath layer having porous properties that allow liquid to flow through to a conductor and thus that does not operate to repel a liquid ionic in nature or dissolve when contacting a strong acid or alkali liquid Thus, also unlike TAKAHASHI, the structure of the insulative sheath of the present invention is not dissolved or destroyed such as is the structure of the two insulative sheaths disclosed in TAKAHASHI upon contact with a predetermined level of sulfuric acid or strong alkalis.

While the sheathing on the TAKASHI conductor would need replacing after dissolving upon contacting leak of sulfuric or alkali capable of dissolving, ours is capable of repeated use, making ours more durable and reliable.

Unlike the present invention, the TAKAHASHI reference discloses dissolvable insulators that would need to be replaced upon contact with sulfuric acid or strong alkalis. In contrast, the single insulative, porous sheath of the present invention operates as a short between conductors when contacting an ionic liquid or fluid and is capable of repeated use. Thus, the sheathing of the present invention is more durable and therefore, more cost effective than the sheathing or insulative layers taught in the TAKAHASHI reference.

The arguments used in defense of Claim 1 can be similarly applied to Claims 13 and 18. Therefore, the present

invention, as set forth in the now amended claims 1, 13, and 19, and the claims that depend from claims 1, 13, and 18, respectively are clearly distinct from the art of record.

Thus, it can be seen that the TAKAHASHI reference does not disclose the present invention, obviating the rejections thereof rendered under 35 U.S.C. §102(b).

Rejections under 35 USC § 103(a)

Claims 2 and 4 stand rejected under 35 USC § 103(a) as unpatentable over TAKAHASHI in view of PRINCE;

Claims 10-12, and 21 stand rejected under 35 USC § 103(a) as unpatentable over TAKAHASHI in view of GOTT.

The rejection of claims 2, 4, 10-12, and 21 based on TAKAHASHI, PRINCE, and GOTT is respectfully traversed.

PRINCE provides an apparatus and method of providing a conductive drip tray able to determine when a leak dripping into the drip tray has exceeded a predefined height. See PRINCE, Abstract, and FIG. 1.

By contrast, the present invention, as previously discussed, provides an electrically insulative sheath and low resistance electrical short therethrough in the event of a liquid leak penetration of an ion fluid. See 102 discussion, **supra**, and amended Claims 1, 13, and 18 of the present invention as previously discussed.

Additionally, the present invention defines a conductive drip tray having a conductive path that provides little

resistance when the liquid leak penetrates the sheath and drips onto the tray.

Claims 22 and 23, which depend from claim 2 were added to further define the function of the sensing wire and drip tray of the present invention, namely to determine presence and **location** of a leak in a conduit. Support for adding claims 22 and 23 is disclosed in Applicants' Specification, paragraphs 0034, 0042, and FIGS. 5 and 8.

"[D]rip tray 83 provides a portion of the electrical circuit needed to determine the presence and **location** of a fluid leak by the sensing wire 85. A fluid leak bridging the sensing wire 85 and the drip tray 83 is labeled 87 in Fig. 8B. The portion of the sheath 86 appearing mottled or dotted represents absorbed fluid 87. The bridged fluid 87 effectively provides an electrical current path between the sensing wire 85 and drip tray 83 at a point in the run of sensing wire 85. The ionic nature of the fluid makes this current path an effective short between the sensing wire 85 and the drip tray 83. **The presence and location of such a fluid short along the sensing wire may be inferred** by monitoring electrical parameters of the sensing wire . . . ." Applicants' Specification, paragraph 0042.

Thus, the determination of the **location** of the liquid leak penetration through the electrically insulative sheath onto the tray is determined by aid of the drip tray of the present invention.

Contrary to Examiner's contention in the January 21, 2004 OA, page 7, clause 6 that the tray of the present invention merely senses current and contains liquid to not leak on a

floor, the tray of the present invention provides detection of a location of a fluid leak.

Nowhere does PRINCE teach finding the exact location of the leak, but rather the PRINCE drip tray only teaches indication of a presence of a leak. Furthermore, TAKAHASHI specifically teaches its inherent repellence to liquids, such as water, for the inner liquid resistant sheath and hence inability to absorb water diluted liquids such as those outlined in the Applicants' specification thereby teaching away from the present invention. If the TAKAHASHI invention, as previously discussed, were combined with the invention disclosed in PRINCE, the resulting structure including the PRINCE drip tray would not aid in the detection of the exact location of the leak. Thus, combining PRINCE with TAKAHASHI would still not render applicants' invention. Therefore, there is no motivation to combine the PRINCE and TAKAHASHI to render the present invention.

Additionally, the applicants therefore respectfully submit that even if the "liquid level detector" of PRINCE can be equated the drip tray of the present invention, claims 2, 4, 22, and 23 are not rendered obvious under 35 USC 103(a) since the primary reference of TAKAHASHI does not teach claim 1, unto which claims 2, 4, 22, and 23 depend.

Gott discloses a tape carrying flat, spaced conductors. The conductors are **exposed and uninsulated**. Furthermore, the conductors are always found in parallel pairs. Gott stresses that the flat nature of the conductors is critical in as much as small droplets may be impeded from migrating across the parallel conductors. See GOTT, col. 3, line 48-col. 4, line 5.

Similarly, Gott nowhere suggests, and in fact teaches away from, utilizing a sheathed conductor since such would add significantly to the thickness of the conductor, is not consistent with the "thin as possible" objectives (exemplary thickness of not in excess of 20 mils) and would impeded flow across the conductors. See GOTT, col. 3, lines 48-53. Even if GOTT teaches leak detection using a visual indicator, adding GOTT to TAKAHASHI would be contrary to the teachings of TAKAHASHI because GOTT teaches away from using a sheathed conductor such as is taught in TAKAHASHI and therefore, does not disclose a motivation to be combined with TAKAHASHI.

Additionally, the applicants therefore respectfully submit that even if the "moisture responsive visible indication means" of GOTT can be equated the liquid detection using a visual indicator of the present invention, claims 10-12, and 21 are not rendered obvious under 35 USC 103(a) since the primary reference of TAKAHASHI does not teach claims 1, or 21 unto which claims 10-12, and 21 depend, respectively. The references fail to provide the necessary motivation of one skilled in the art to combine the individual teachings to arrive at the Appellants' invention. The references, even when combined, fail to yield Appellant's invention.

The prior art of record does not teach, suggest or remotely hint alone or in combination the insulative, porous sheath and drip tray of the present invention. Therefore, claims 2, 4, 22-23 are patentably distinct from the prior art of record.

The foregoing amendments further clarified some of the features of the liquid leak detector. It is believed that the present invention as amended is novel and non-obvious over the references relied upon by the examiner.

Additionally, as discussed previously, because none of the references cited and relied upon by Examiner disclose, teach or suggest all of the features alone or in combination of the claimed invention, the 102 and 103 rejections are believed to be obviated.

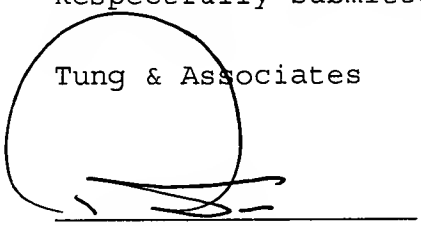
Based on the above, it is respectfully submitted that the amended claims 1, 13, and 18, claims depending therefrom including newly added claims 22-23 are in condition for allowance, which allowance is earnestly solicited.

Based on the foregoing, the Applicant respectfully submits that all of the pending claims are now in condition for allowance. Such favorable action by the Examiner at an early date is respectfully solicited. If for some reason Applicant has not requested a sufficient extension and/or have not paid a sufficient fee for this response and/or for the extension necessary to prevent the abandonment of this application, please consider this as a request for an extension for the required time period and/or authorization to charge our Deposit Account No.50-0484 for any fee which may be due.

In the event that the present invention is not in a condition for allowance for any other reasons, the Examiner is respectfully invited to call the Applicant's representative at his Bloomfield Hills, Michigan office at (248) 540-4040 such that necessary action may be taken to place the application in a condition for allowance.

Respectfully submitted,

Tung & Associates



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